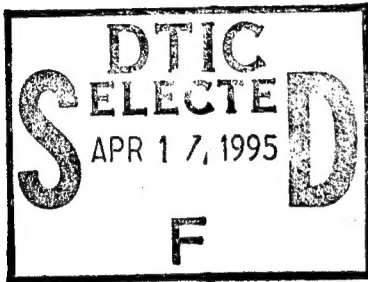


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NAVAL WAR COLLEGE
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IMPACTS ON THE OPERATIONAL COMMANDER IN THE INFORMATION AGE



by

Ernst K. Isensee

Major USA

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements for the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of Operations.

Signature:

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Abstract of

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As a matter of record most senior defense leaders have acknowledged that the United States military is experiencing a revolution in military affairs during what has been termed the information age. The debate in this revolution is based on how the integration of knowledge-based systems into U.S. military forces will effect force structure and future conflicts. However, the indeterminate influence of information age technology on the means of conducting warfare will have a significant impact on the way an operational commander employs his forces. Paradoxically, the information age commander will find a greater level of uncertainty and inflexibility to conduct major operations and campaigns with knowledge-based forces.

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I. Introduction

The ongoing Revolution in Military Affairs (RMA) is creating a broad discussion on the future changes in modern warfare. The onset of regional socio-political tensions and the advancements in military technology have fueled a debate over how the United States will fight in a post cold-war world. The general consensus in the defense community is that America's technological advances in standoff precision guided munitions, operational/tactical real-time intelligence, and pervasive C4I capabilities will change how warfare is conducted in the future.¹ Advancements in military C4I systems will provide U.S. forces a more technologically sophisticated capability during single service or joint operations. However, military history has also shown that the predominate number of revolutionary technologies have not in themselves caused changes in warfare. It has been either the failure or foresight of the commander to employ those advancements through sound tactics and operational art that have defined the character of war. The major difficulty faced in planning any future operation or campaign will exist in the commander's ability to integrate information age technology into his operational design.

II. Thesis

The premise of this paper is to predict the significant problems faced by the operational commander in the information age. As a result of knowledge-based technology defense experts have predicted historic changes at the strategic level of the

military. The principal areas of change will occur in the future conduct of warfare, military force structure and doctrine development. The consequences of these unprecedented effects at the strategic level will impair the commander's operational design in two major areas. First, the fundamentally different impact of C4I advancements from the historical influence of technology will introduce a greater level of uncertainty into the commander's operational planning and employment of forces. Secondly, by tailoring military resources based on the perceived advantages of information technology, the commander may employ a less flexible force to accomplish operational missions.

III. Background

A. *The Information Age Impact on Warfare*

There are two distinct theories for the evolutionary path of warfare and the impact of technological advancements. The first theory espoused by RMA experts follows the application of technological innovations to military operations in the industrial, nuclear and information dominated ages. The second theory more closely follows the changing nature of warfare through the political, social, economic, and scientific revolutions of emerging civilizations. This theory has collected extensive publicity from both military and political leaders. Based on Heidi and Alvin Toffler's War and Anti-War and Martin Van Creveld's Technology and War these theories presume that the most advanced technological nations have historically defined the

nature of warfare in three stages - agrarian (First Wave), industrial (Second Wave) and information ages (Third Wave).²

Both theories come to the single conclusion that warfare has entered into the knowledge-based information age. Many military experts point to the Gulf War as a precursor of future conflicts in an information dominated era. The near-real time intelligence and precision guided munitions available to both operational and tactical battlefield commanders in the Gulf War was said to represent only a portent of the C4I capability of the information age military force.³

But unlike the predominately agrarian and industrial ages that have kindled the revolutionary changes in warfare, the information age will have a fundamentally different kind of impact on military operations and doctrine. Technological innovations have historically fallen into two categories - advanced firepower and/or maneuver capabilities.⁴ Technologies based on firepower such as the rifled muskets during the American civil war and the machine gun in World War I have proven to strengthen the defense. Maneuver innovations have enhanced the capability to improve offense capabilities as illustrated by armored vehicles and air power during World War II. However, the technological influence on warfare anticipated from the information age does not neatly fit into either the firepower or maneuver categories.

B. *The Information Age Impact on Military Forces*

Given the difficulty to classify the impacts of information age technologies on warfare, military experts are struggling to predict how knowledge-based armies will fight in the 21st century. The current "brainstorming" that is occurring among U.S. military leaders and RMA experts have established two presumptions 1) We are entering an information age, although the eventual nature of a knowledge-based society and the influence those forces will have on the military is still vague and 2) Doctrine must be shaped to effectively apply future information age technology in operations and force structure design.⁵ Thus, the services have predicted that the degree to which a military force can control information will displace a nation's industrial capacity as the principal element in warfighting potential.

Based on the general direction of civilization as outlined by the information age proponents, defense experts have delineated the characteristics of a "Third Wave" military. The combined effects of a constrained defense budget and the elimination of a cold war threat have resulted in a restricted procurement plan for future generation weapon systems. Instead knowledge-based technology will be used to increase the capabilities of existing systems. Most of the military leaders and defense experts have outlined the following characteristics of the future military force:

- a. Smaller total services due to downsizing requirements.

b. Many operational units will be reorganized into smaller components. It is anticipated that information age technology will facilitate smaller units that are more lethal and survivable on the battlefield.

c. Most of the weapon and logistical systems currently in use will not be replaced in the near term.

d. Current weapon, logistic and communication systems will be upgraded with C4I technology emphasizing greater interoperability between services.⁶

Service leaders anticipate that "Third Wave" technology will enhance the military's abilities to fight throughout the spectrum of conflict (low to high intensity) against all types of enemies (First, Second, and Third Wave). However, knowledge-based technology is only a conduit for the actual force multiplier of a pervasive real-time intelligence capacity. Therefore, an information age commander's expectation and demand for decisive military intelligence will be paramount in both the planning and execution of major operations and campaigns. Force structure limitations combined with the operational imperative for decisive real-time intelligence will directly effect the commander and his employment of knowledge-based systems. This situation will create a dilemma in planning and employing information age forces that cannot be overcome through the application of a comprehensive doctrine.

C. The Information Age Impact on Doctrine

Throughout history technological changes have essentially advanced the *means* of waging war and subsequently effected the evolution of tactics and operations. To facilitate the effective employment of forces with technological advances many of the

services, particularly the Army, develop doctrines that accommodate future technology. The Army integrates doctrine with equipment modernization, education and recruitment as a mechanism to maintain a "trained and ready force". This concepts-based-requirements system (CBRS) uses Army doctrine to make the "physical changes" in military hardware and force structure.⁷

Therefore, the acquisition of military technologies is expected to provide the Army with the *means* of executing its doctrine. A prime example of the CBRS was the Army's Airland Battle doctrine which depended on procuring weapons systems like the AH-64 (Apache helicopter), M1 (Abrahms tank), and precision guided munitions while reorganizing the force structure in accordance with the Division '86 plan.⁸

The Army is making "the first intellectual step towards a new doctrinal paradigm of knowledge-based operations (FM 100-6) enabled by information technology."⁹ Rather than changing the means of warfare this doctrine reflects how the information age will directly effect the way future operations are conducted.

The emerging doctrine stresses the importance of disrupting the enemy's decision cycle through attacks on his command and control systems. At the same time the doctrine emphasizes the requirement to increase the speed and accuracy of the friendly decision cycle through enhanced command and control. The combination of attacking an adversary's use of information while enhancing and protecting friendly information provides a *decisive advantage* [emphasis added].¹⁰

During the cold war the military could focus on a known enemy and a known battlefield from which to establish doctrines that required specific weapon, logistic and communication

systems. But today's wide spectrum of threats and the uncertain endstate of an information age military do not facilitate doctrine development and the CBRs.

Whereas technological requirements were established to enhance the physical capabilities of supporting doctrine, information age technology will not provide equipment that directly strengthens the commander's operational fires or maneuver. Currently, operational commanders know with relative certainty their physical capabilities to execute doctrinal goals *before engaging in hostilities*. However, information age technology is *expected to provide* the knowledge necessary to facilitate "on the run" decision making and precise targeting throughout the depth of the battlefield. Therefore, doctrinal concepts for an information age military are difficult to establish without knowing before hand the relative effectiveness of knowledge-based systems in any given situation. Ironically, the information age will mark a return to the historical cycle of first acquiring military technology and then developing the tactics and operations to employ those advantages. Under these conditions of uncertainty the operational commander must overcome a broader set of problems that will be crucial to his planning and decision making.

IV. The Information Age Impacts on the Operational Commander

A. Adding Uncertainty to the Operational Design

The commander's dilemma in planning becomes one of integrating qualitative versus quantitative advantages in his

operational design. Prior to arriving at the battlefield the commander knew with relative certainty the capabilities of his forces. But the increased potential for real-time intelligence from C4I technology will not physically alter the range, speed or rates of fire for existing weapon systems. The obvious questions that the information age commander will ask are:

1. How certain can we be to accurately target all the critical elements of the enemy's center of gravity with knowledge-based systems before and during operations?
2. How certain are we about knowing all the enemy's capabilities?
3. If we do know all his capabilities how quickly can I know his intentions and then react accordingly?
4. How certain are we that the deception and psychological operation plans will be effective?

Although these are commonly asked questions, they will become operational imperatives for the information age military. But these questions can only be answered subjectively, as opposed to the quantitative basis of measuring capabilities in the agrarian and industrial types of warfare. In addition to the planning phase the operational commander will also be uncertain about the reliability of information age technology during the execution phase.

Information technology provides only the promise of acquiring knowledge in which to observe, orient, decide and act. The effectiveness of knowledge-based systems can only be measured through the accumulation and management of suitable real-time information. Therefore, knowledge of the enemy and the ability to effectively coordinate forces through advanced C4I systems are

resources that the commander will not be able to quantitatively measure until he employs his forces.

Complicating the reliability of knowledge-based forces are the requirements for each step in the decision cycle. Observing will require the continuous ability to maintain decisive intelligence on the terrain, weather, noncombatants, and both enemy and friendly force dispositions. Orienting will require the ability to maintain continuous C2 with all friendly forces to include the possible inclusion of coalition partners. Deciding will require the ability of the commander to manage the enormous amounts of battlefield intelligence and isolate the critical bits of information to form a decision. And finally, acting will require accurate targeting data. Since this is a sequential process any misinformation or single failure in the four components will negate the "decisive advantage" of information technology.

Besides the inherent unreliability of a sequential decision cycle, knowledge-based systems are susceptible to internal and external forces that create uncertainty in the commander's operational design. Knowledge-based systems are designed to eliminate the "fog of war" or Clauswitzian friction and thus lessen the uncertainty in the commander's decision making. But ironically, for such a process to be completely effective the systems themselves must also be impervious to "fog" or friction.

Unfortunately, the commander has little or no control over external factors such as weather and politically imposed

constraints which may reduce the effectiveness of the knowledge-based forces. The enemy may also actively take measures to counter the commander's superior technology. Deception, electronic warfare and other operational security measures will induce a level of uncertainty into both the planning and execution of military operations. Additionally, the enemy may be impervious to high technology systems. A "First Wave" or agrarian based society will have little or no electronic signature to detect. Given that the world will always be composed of economically stratified nations it becomes evident that a force dependent on information age technology may still be required to use "First" or "Second Wave" tactics and operations.

Internal friction will also reduce the effectiveness of a knowledge-based force. First, the relative maintenance costs and mechanical reliability in high technology will always minimize the effectiveness of the force to some degree. Secondly, the information age commander will increasingly rely on automated decision and planning aids in order to process enormous amounts of intelligence. The expert systems and artificial intelligence processes that will be required to assist the commander in making instantaneous decisions cannot guarantee the most effective "advice". There is no computer systems more powerful than the human mind in weighing the science and art of military operations for any given situation. But, unfortunately only the computer can process the massive amounts of data available in a major military operation or campaign.

A common means of offsetting the operational risks and uncertainty is to apply overwhelming force against the enemy. In this manner commanders can respond to unforeseen factors and accomplish branches and sequels to the original plan. However, the information age military may negate the commander's flexibility to employ forces necessary to accomplish those tasks.

B. Decreasing Operational Flexibility

The second change associated with the information age involves the degree to which technological advancements will change military force structure and the task organization process in operational planning. Many defense experts envision the smaller military composed of forces that are specialized to perform a narrow range of tasks.¹¹ One example of these changes are reflected the way knowledge-based technology will effect the Army's battlefield operating systems (BOS) - maneuver, fire support, C2, intelligence, mobility, combat service support and air defense.

It is expected that the operational commander will task organize his forces based on the capability of selected forces to perform specific BOS functions.¹² However, these smaller units will only be specialized to perform a narrow range of tasks. Therefore, the operational commander's overall force may not be composed of combat divisions or brigades capable of operating independently to perform a variety of missions. This inflexibility will have three major drawbacks.

First, each component of an information age force will be critical to the success of the entire mission. Without the redundant capability to perform a variety of missions, the individual units that will compose an information age task force are susceptible to failure. Additionally, the enemy will only need to identify the critical BOS capable units as the center of gravity for the entire force. Secondly, the narrow range of tasks that can be performed by individual units will limit the to execute independent missions and exploit opportunities. And finally, unforeseen events that require the operational commander to execute branches or sequels to the original plan will be severely constrained. Poorly structured and without the means of individual units to conduct independent operations the commander's ability to exploit operational advantages will diminish.

In addition to the limitations of task specific forces another source of inflexibility that will affect the operational commander abides in the doctrinal path of the "Third Wave" military. The American way of war has been traditionally steeped in a Clauswitzian framework of massed physical force. This tradition culminated in the Weinberg doctrine of conducting short decisive operations through overwhelming physical force. However, based on the "Third Wave" theories many experts predict that battlefield intelligence will eventually supersede physical force capabilities as the predominate form of warfare.¹³

Many military proponents of the information age predict the shift from a Clauswitzian reference to the philosophy of Sun Tzu - "victory without fighting as the acumen of skill." The Sun Tzu approach of "victory without fighting" will certainly test the operational commander who makes perceptible shifts from a dependency on physical capabilities to information age warfare. The greatest danger to face an information age commander will be an opponent that places a premium on his ability to inflict physical destruction.

V. Recommendations

This paper makes several recommendations for the evolution of an information age military.

1. The Army is currently developing doctrine through test exercises by the 2nd Armor Division. However, these tests must also include mechanized, light, airborne, air assault and the special forces components of the Army. These test should not be limited to the NTC environment but should include the JRTC. Also, exercises should cover the entire spectrum of conflict. It would seem shortsighted to believe that the domain of information warfare and the digitized battle field should reside in the Armor and Cavalry branches of the Army.

2. Without the full participation of all services in developing doctrine the information warfare test results of the 2nd Armored Division will be faulty. Senior military leaders appear to recognize that information warfare and joint interoperability cannot be mutually exclusive. Therefore, it

would seem improper for the Army to begin restructuring it's forces and drastically altering doctrine without parallel efforts by the other services.

3. Specialization of forces through the perceived enhancement of knowledge-based systems should be tempered by the military commander's ability to maintain operational flexibility. His flexibility should not be limited to only one form of warfare. He may plan for a "Third Wave" operation and be faced with a "First Wave" war.

VI. Conclusions

Military experts anticipate that future technologies will make the military a more survivable and lethal force based on accurate firepower, real-time intelligence and pervasive C2 capabilities. However, the repercussions of an over dependency on advanced technology can degrade military efficiency. The information age is still a vague premise with an undefined endstate. Both military and political leaders may eventually find the visions of technological superiority a hollow promise. Cost overruns in building the future force, over sold capabilities by the information age enthusiasts and cheaper competitive strategies by our enemies are all likely to derail future dependency on a knowledge-based military.

NOTES

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